JOURNAL

JULY, 1932

Wm J. McKEEN

A. S. T. E. Journal

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J. A. Siegel, President

W. H. Smila, First Vice-President

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Address all communication relative to editorial matter and copy to Publicity Committee, 8316 Woodward Ave., Telephone: MAdison 5048.

Announcement

By action of the Board of Directors it was decided to offer, as a special inducement during our present membership drive, to admit new members upon the payment of $3.00, the regular initiation fee.

No dues will be required for the balance of the year 1932, providing the application is filed during this drive for members.

We have set 1000 members as our goal for the year 1932, and ask every member to notify all prospective members of this action.

We believe that no better investment of $3.00 could be made by Tool Engineers than the purchase of a membership in the American Society of Tool Engineers.

MEMBERSHIP COMMITTEE

For detailed information kindly fill out the following blank and mail.

AMERICAN SOCIETY OF TOOL ENGINEERS
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Kindly send me further information regarding your society.

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NEXT MEETING

July 14th, 1932 — 8:00 P. M. — Colonnade Room

Detroit Leland Hotel

Speaker

MR. G. E. MESSER, B. S. E. E.
Industrial Heating Specialist
General Electric Co.
Detroit Branch

Subject:

"What Tool Engineers Should Know About Hydrogen Copper Brazing"

Mr. Messer is a graduate of the University of Colorado, Class 1926. After leaving the University he started with The General Electric Co. at Schenectady, New York, as Industrial Heating Engineer in the test department. Was transferred to the Detroit Branch four years ago.

In his talk July 14th he will deal with the fabrication of metals by the new process of Hydrogen Copper Brazing. This subject, we believe, will appeal to Tool Engineers and manufacturing executives. The talk will be illustrated by motion pictures.

Mr. Messer will be glad to spend as much time after the formal talk as you may desire in answering questions and discussion.

In addition to the above the Meetings Committee promises another good speaker as a surprise.

The Meetings Committee consists of E. Boone, W. Fors, A. H. Hoffman, E. J. Ruggles, Chairman, Sam Read, A. Gulberg, H. T. Johnson, and C. S. Horn. The picture is of the first five in the order named, the rest of the Committee being absent for various reasons. The ones in the picture had a wonderful sail and a good dinner at the Detroit Yacht Club at the June 27th Committee meeting.

The Committee is working on a year's schedule of speakers which will be printed in an early issue of the Journal.

REPORT OF LAST MEETING

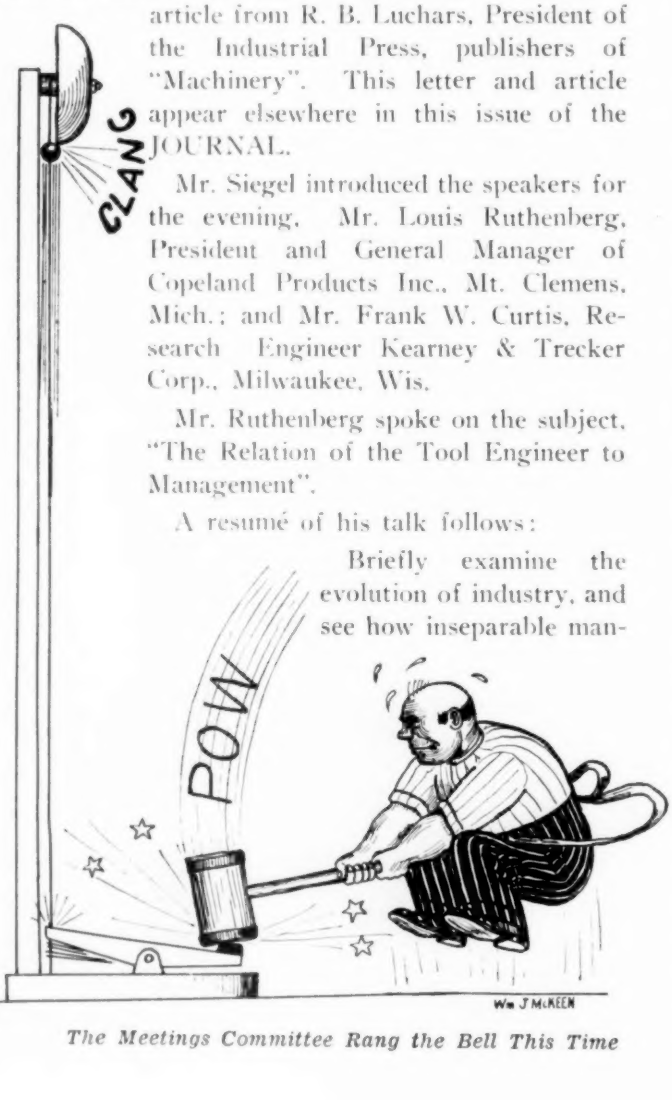
Held June 9, 1932, at Detroit Leland Hotel

President J. A. Siegel opened the meeting and announced the membership drive being put on by the membership committee. They have set one-thousand members in 1932 as their goal, and ask the help of every member to enable them to reach this goal.

The new A. S. T. E. emblem was described, and members were informed that they could place their orders for this button with Fred L. Hoffman, chairman of the Emblem Committee, directly after the meeting.

Members were asked to help in getting out the JOURNAL by contributing items, technical or practical, to the Publicity Committee for use in the JOURNAL.

Communications were read by Secretary "Al" Sargent, the most important of which was a letter and article from R. B. Luchars, President of the Industrial Press, publishers of "Machinery". This letter and article appear elsewhere in this issue of the JOURNAL.



The Meetings Committee Rang the Bell This Time

Mr. Siegel introduced the speakers for the evening, Mr. Louis Ruthenberg, President and General Manager of Copeland Products Inc., Mt. Clemens, Mich.; and Mr. Frank W. Curtis, Research Engineer Kearney & Trecker Corp., Milwaukee, Wis.

Mr. Ruthenberg spoke on the subject, "The Relation of the Tool Engineer to Management".

A resumé of his talk follows:

Briefly examine the evolution of industry, and see how inseparable management and tool engineering have been in the industrial era. You need not go back very far to visualize the beginning of the present industrial era. The development of several revolutionary inventions changed the entire civilization of the world in a period of two-hundred years, and brought out several very interesting principles. The principle of the transfer of skill and the multiplication of skilled operations was brought about through the transmission of knowledge to those who were qualified to carry out plans without the very high training of the originators, and there the tool designer was born, because through the designer the design was transmitted, the plan translated, and the actual product built.

We have gone through very important steps in the evolution of tool designing and management. We found that people demanded a great many things, so we entered into a greater era of production so that larger quantities were available.

Transportation was particularly important in the development of this country, and it seems almost miraculous how the development of transportation coincided with our needs. You may recall the "Whiskey Rebellion" in the early days of Pennsylvania. The Whiskey Rebellion was simply a need of better transportation. It was brought about by the fact that as soon as our settlers went across the Alleghanies, the farmers who settled there had to reach a market for their products. There was no transportation at the time that would justify shipment of grain from Pennsylvania to the Eastern States in any form except the form of distilled liquor, and in the Eastern States a tax was placed on distilled liquor, with the result of the uprising in Pennsylvania known as the "Whiskey Rebellion".

Things moved slowly for some time after the Civil War. Business was simple. Almost anyone in those days could go into manufacturing and make a profit. Those were the "Palmy Days". But along towards the late '80's and early '90's a great change, a second industrial development, took place. This was the beginning of Scientific Management. Business found that profits depended upon manufacturing according to the best plan available, and this brought about a close co-operation between management and the Tool Engineer, because the Tool Engineer was the best man to develop this best plan. Just about this time high speed steel was developed, and management and the Tool Engineer had to walk step by step. Thus their relationship has been a most intimate one.

That relationship is perhaps more important today, for it is evident to all of us that we are passing through still another phase of industrial development which requires more industrial management, and the Tool Engineer is going to figure largely in this development.

With the tremendous expansion of industry during the past twenty-five years, we have adopted some interesting ideas. Whether they will be ultimately sound is a question. We have conceived the idea of mass production to a tremendously developed degree, yet we did not understand production until after the development of the automobile.

Prosperity is wealth in motion. These days you often hear the question, "Why the present depression when we have more wealth in the country than we ever had? Savings are greater, etc." The locomotive in the railroad yards weighs just as much as it did a few years ago when it pulled trains over the rails, yet it is doing no good standing there idle. Neither is our piled up wealth doing us any good.

In the future we are not going to regard that Tool Engineer as the most efficient who would reduce the labor factor to the greatest degree. We have been going along with the mistaken idea that he is to cut down that direct labor cost. That is not the story. Less money for tools and more money spent for direct labor will bring about a change in economics.

There's a Wee Wifie Waiting

Now of course, we have not come to the end of things by any means. You Tool Engineers have seen things happen right under your nose which should convince you that we are still in the experimental stage. These 1932 or '33 cars look awfully good, but look down on them from above and see if they don't look like a fish swimming backwards in the water. I believe it is an actual fact that we can take most of our automobiles backwards and get better stream line and better speed than forward. The public may decide that they do not want the engine in front any longer, but want it in the rear so that they can use a smaller engine and get more speed. That may sound like a radical statement, but I was among those present when the self-starter was invented, and it obsoleted every car then in use.

Let us look at the economy of the low priced car. There is none at present, for the low priced car builder has moved up to the intermediate price class. Isn't it reasonable to assume that there is still a market for a low priced car? We can now build an engine of the same horse power with less displacement and much less weight. The weight and cost of a car can be reduced. There may be a kick-back and it will fall right in the Tool Engineer's lap. A year from now everything will look different.

What the Tool Engineer Should Know About T-C Milling

By FRANK W. CURTIS, Research Engineer,
Kearney & Trecker Corp., Milwaukee, Wis.

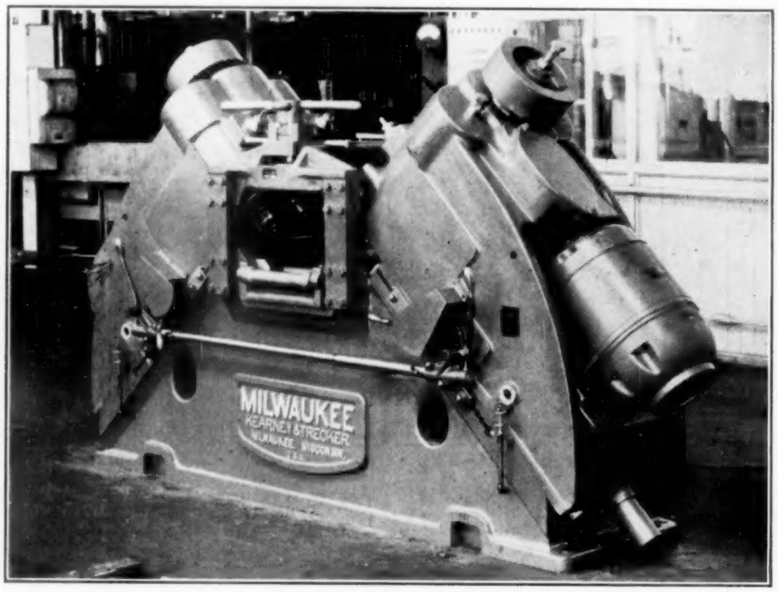
Manuscript of talk given at the June meeting at the Detroit Leland Hotel

The tool engineer has a problem before him today which differs much from the usual procedure. This problem is the application of tungsten and tantalum carbides for metal-cutting purposes. These carbides are so unlike the tools we have used in the past that methods will have to be changed considerably to meet the demands of the correct application needed for success.

The greatest problems, as they exist, will be the selection of equipment basically designed for use with these carbides, and the design of fixtures for holding the work to be machined. Traditional practices cannot be carried out successfully because of the vast advances that exist between carbides and the tools which we have been accustomed to using.

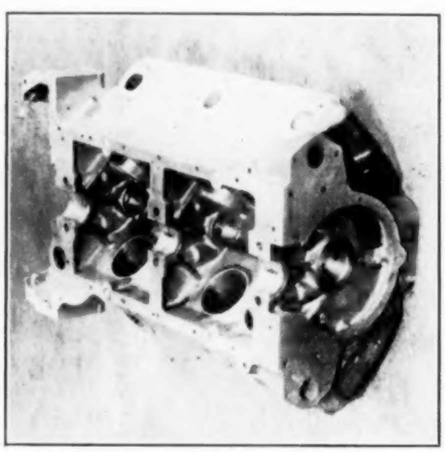
We do not have to go back far to realize the advancements that have been made in the cutting of

metals, together with the development of machinery to suit the new conditions. With high speed steel, our ratio of increase was approximately two to one. In other words, with high speed tools machining could be done twice as quickly as with carbon steel tools. This meant that stronger machines and bigger and better fixtures had to be constructed.



This is a six spindle machine arranged for the milling of manifold pads on a V-8 engine. The machine is very massive in construction, and has been designed basically for use with tungsten carbide so that the maximum output may be obtained. The cylinder block is placed in at the front end of the machine, then milled, and then released at the other end of the machine. In reality, the machine forms part of the continuous conveyor.

With tungsten and tantalum carbides, we are dealing with a material that can operate from three to four times faster than high speed steel. From this it is quite evident that the ratio is much higher than we have ever encountered in the past.



This shows the V-8 cylinder block, showing the exhaust pads to be milled.

When a tool is called upon to remove more metal per minute, it is natural to assume that this tool should be much larger in size than heretofore - - perhaps in a direct relation to the increase in material to be removed. From this, it is obvious that the outstanding consideration will be that of rigidity. Most failures up to this time have existed largely because tungsten carbide tools have been applied in a manner similar to past practices, which, all summed together, can be classified in either one of two ways. First is lack of strength in the tool, and second, the use of a tool which does not lend itself to tungsten carbide application.

Tungsten carbide for milling has already passed experimental stages, and today is in use successfully in many plants. Research will continue, of course, but at this time enough is known to predetermine the results that can be attained with tungsten carbide on certain forms of milling operations. True enough, tungsten carbide milling is limited in scope, some operations being impossible at this time, but the rapid progress now being made is gradually broadening the use of carbides for milling to such an extent that the present limitations will be narrowed greatly as time goes on. Face milling with inserted-blade cutters is perhaps the most common class of tungsten carbide milling at this time, largely because carbides lend themselves so favorably to cuts of this kind.

Milling is without question one of the most practical applications for tungsten carbide when compared to other metal-cutting operations. In a lathe operation, for example, one or two tools usually do all the work, but with a milling operation the metal removal is divided among a much greater number of teeth so that no great load is ever imposed upon any one cutting edge. In turning, a feed of 1/32 inch per revolution is not uncommon, yet in milling, half this amount per tooth is rarely reached. From this it is evident that a cutting edge with less feed, and therefore less duty to perform, will stand up much longer than one cutting at a heavier feed.

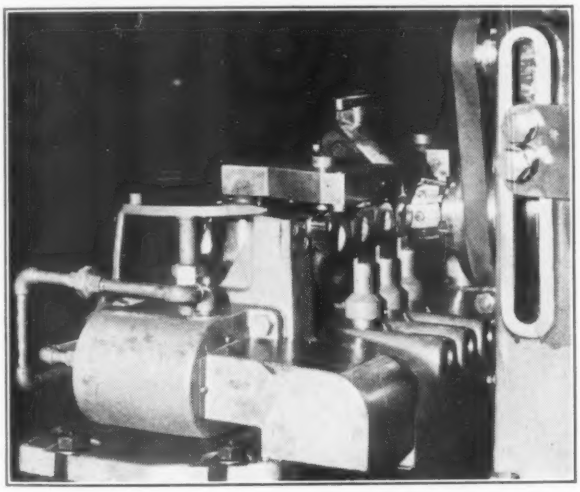
This comparison is made merely because tungsten carbide turning is conceded to be entirely practical, whereas there are many who have doubts as to the practicability of tungsten carbide milling. Tungsten carbide turning and tungsten carbide milling are two entirely different types of operations, but from a standpoint of volume a milling cutter can finish a greater area per minute than a single-point tool, just because there are several teeth that do the cutting instead of only one.

There are two distinct gains to be made by the use of tungsten carbide for milling. One is longer life between grinds; the other is more output. Where the set up time in changing cutters is great, tungsten carbide can be used profitably at the same feed now possible with other cutting materials because of its long-life advantage. However, increased output combined with longer cutter life between grinds is the most usual gain.

Best results are attained from milling machines basically designed for tungsten carbide operations, yet there are many existing machines that will perform favorably with tungsten carbide cutters without being subjected to any undue strains, depending of course upon the nature of the job and the capacity of the machine. Old, dilapidated machines are never considered practical, but machines of recent manufacture, in good condition, will yield surprising results.

Rigidity Is of Utmost Importance

The outstanding foe of tungsten carbide is vibration. Or to put it another way, the most essential requirement is rigidity. This holds true with any tungsten carbide operation, especially milling. There are three factors that contribute to the combined rigidity needed for tungsten carbide milling — the machine, the fixture, and the cutter. One is equally dependent on the other, so much so that a weakness in one would offset the effectiveness of the other two.



This shows the milling of an exhaust manifold at a feed of 32 inches a minute. The fixture is of modern design, especially laid out for tungsten carbide milling. The cutter is 4 inches in diameter and operates at 320 feet per minute. The machine is a Milwaukee Simplex No. 1236.

With any milling machine, the spindle should never have any more end play than normally required. Likewise, backlash of the spindle drive should be kept to a minimum. The table gibs should be properly adjusted, and there should not be excess play or backlash in the lead screw. If these points are correct, then the results should be satisfactory.

Considering the fixture, it is well to say that rigidity is again of utmost importance. The question was once asked as to what would be the best rule to follow in the design of a fixture, and the reply was, "Make the fixture as strong and husky as your better judgment directs; then add about 50 per cent more strength as a margin of safety." This is about all that can be said. Clamps should be unusually strong, the locating points should be of a positive nature, and the work piece should be given as much support as possible. There is a decided advantage in making a fixture such that the work can be located and clamped quickly. In most cases the loading time should be reduced in proportion to the cutting time in order to gain the full benefits of tungsten carbide milling. If possible, provide fixtures that will permit the alignment, location, and clamping of the work by operating a single handle. Fixtures should be quick and fast, positive and foolproof, and above all strong and husky. In some cases existing fixtures are entirely satisfactory, but where a new fixture is needed it should not be considered a hindrance to tungsten carbide milling.

The same rule of rigidity applies to cutters. Above all, the cutting edges should receive adequate support, and if the cutter is of the inserted-blade type the blades should be positively locked in the body so that there is no possible chance of having them push away from the cut, or to become loose in the body.

What About The High Cost?

The tool cost per piece of any product should not be the determining factor as to whether tungsten carbide milling should be used, especially when there are other gains to be made. There are cases where an expensive cutter could be used for a period of two weeks, at a considerable increase in tool cost per piece —but other savings resulting in the two-week period of operation have more than paid for that particular cutter.

Here is an actual example that might illustrate this point. An operator being paid $5.60 per day of ten hours was able to double his output by using a 4 inch tungsten carbide cutter. The job was the facing of a small casting which formerly paid him $1.04 per hundred, but which now pays but 51 cents per hundred due to the increased feed and speed made possible by tungsten carbide milling. That means two days' work in one—or a direct labor saving of $5.60 per day.

The management estimated the burden at $1.00 per hour. This is rather conservative, but anyhow an extra day's work would be equal to $10.00. This means a total daily saving of $14.60. The cutter at $125.00 would pay for itself in about eight days. That is a large return for so small an investment. Suppose only a 25 per cent increase had been made. This would be equal to $3.60 per day. The cutter would pay for itself every 35 days. Or, based on a 300 day year, the investment would yield more than 850 per cent.

In another shop, a tungsten carbide cutter was applied on an existing machine for the milling of pump bodies. The feed used was 8-3/8 inches per minute. The pump bodies were spotted after scraping, and the resulting surface was excellent. In fact, it was possible to eliminate the former scraping operation, which had ordinarily been required, because of the fact that the pieces are now milled with exacting smoothness. The amazing part of the operation was the fact that the pump bodies were machined in one pass, instead of the usual roughing and finishing cuts, in approximately two minutes for both sides —as compared with 18 minutes for both sides as formerly machined.

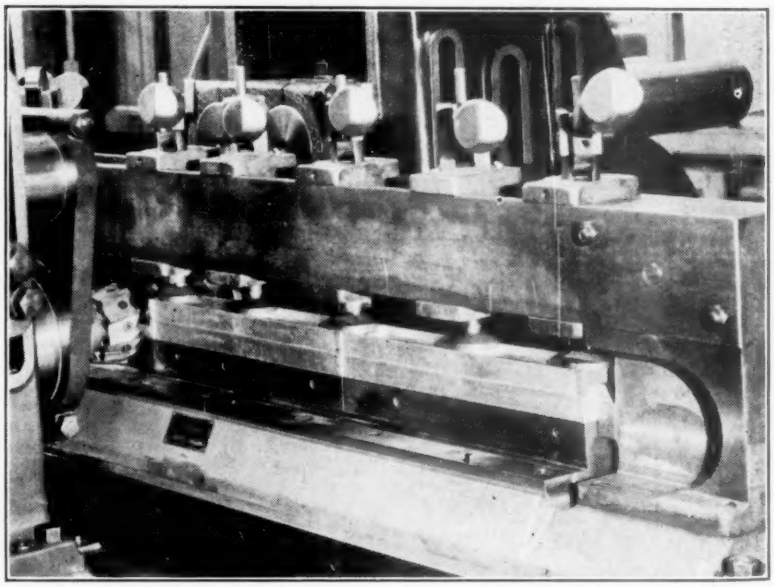
Subsequent Savings Are Numerous

A previous reference mentioned that in one case scraping was eliminiated due to the smooth finish attained from tungsten carbide milling. There are a great many more savings of this nature which are independent of the actual savings attained from the machine itself.

In one tungsten carbide milling operation, which was formerly disc ground — that of milling intake manifold faces — two very careful washing operations had been eliminated. With grinding, abrasive dust lodged into the intake parts, with the result that extra precaution had to be taken to remove these particles. Even after two washing operations, there were cases where the abrasive dust would get into the cylinder after the manifold had been in use. The harm is obvious. Tungsten carbide milling not only eliminated this difficulty, but also produced a better finish.

A more recent case of this kind is the milling of aluminum spirit levels. Heretofore, these castings were disc ground and the surfaces were somewhat scratched. Inasmuch as the surfaces had to be unusually smooth, such as in any precision instrument, it was necessary to add two rough polishing operations and a finish stoning operation. Finishing these levels by tungsten carbide milling has eliminated the two rough polishing operations. Likewise, the usual heat caused by polishing has been eliminated, so that the surfaces do not warp, as they formerly did. This in turn has eliminated a straightening operation. The present feed for tungsten carbide milling these levels is 100 inches per minute, and the milled surface of the level is unusually smooth, so that only a very slight stoning operation is necessary to produce an unusual polished-like surface.

In our own work it has been found that a surface that has been tungsten carbide milled is much smoother than when milled by other cutters, and on ways and flat surfaces that must be scraped, the scraping time has been reduced almost to one-half of what it used to be. This is due to the fact that tungsten carbide milling is done at a high speed and that less heat is



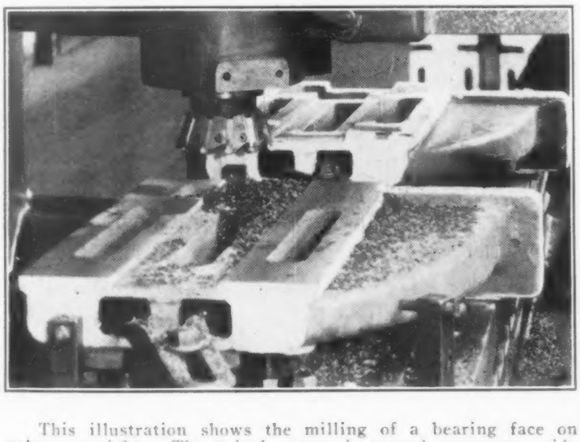
This view shows a No. 1248 Milwaukee Duplex machine arranged for the milling of aluminum levels. These levels are milled on the sides first and then located two in the fixture at a time for the milling of the top and bottom faces. The cutters operate at 1000 r. p. m. and the table feed is 100 inches a minute. This operation was formerly done by disc grinding, but with the milling set up it has been possible to eliminate two polishing operations and a straightening operation, which were heretofore necessary. The finish produced is unusually smooth and the accuracy is much greater than heretofore, inasmuch as the warpage due to heat of grinding and polishing has been eliminated, and since the parts are milled so rapidly to exacting dimensions.

conducted to the work. Then again, a tungsten carbide cutter produces a clean, smooth finish, whereas high speed steel has a tendency to "compress" the surfaces of the metal being machined so that scraping was more difficult.

There are numerous tungsten carbide milling operations in use today which have enabled roughing and finishing cuts to be combined into one. In many cases it is possible to attain a better finish in one cut by tungsten carbide milling than heretofore in two cuts with other cutters.

Other Advantages of Tungsten Carbide Milling

In addition to the advantages that have been mentioned there are others. One outstanding gain is the fact that less material can be allowed for machining a given surface. Tungsten carbide milling is not affected seriously by scale, and where allowances have been from $\frac{1}{8}$ to $\frac{3}{8}$ inches in depth, these can now be halved, or reduced to $\frac{1}{16}$ to $\frac{3}{16}$ inches. When a change of this kind is possible, there is a decided gain to be made in production because of the fact that increased feeds can be used without straining or overloading the machine equipment. Another gain, of course, is the fact that less power per foot of surface machined is made possible.



This illustration shows the milling of a bearing face on column uprights. The 6 inch cutter is passed up on one side of the casting and then is set back on the opposite side so that both faces are machined at one setting. Two pieces are located on the machine so that the operator can be loading one while the other is being milled. On work of this kind, especially where surfaces have to be scraped, the scraping time is reduced as much as 50 per cent, due to the unusually smooth finish produced by T-C milling.

On some work, chipping or breaking away of edges is a serious objection, and with the average cutter it is necessary to reduce feeds proportionately to avoid such a condition. With a tungsten carbide milling cutter operated at a higher speed, it is very rare that edges of a casting are chipped or broken away. This is due to the fact that the feed per tooth per revolution is reduced somewhat from usual practice, although the speed is greatly increased, which thus permits a substantial increase in table feed per minute.

There have been cases where heat treating operations have been eliminated due to the cutting characteristics of tungsten carbide. Naturally, when harder materials are to be machined, the peripheral speed of the cutter must be cut down accordingly. There are certain products which must be made of hard material that at this time cannot be machined economically, due to the high tool cost of cutters, other than those fitted with tungsten carbide.

Volume for Tungsten Carbide Milling

Several times the question has been asked as to the quantity of work which would make tungsten carbide milling profitable. The only answer to this is the fact that for our own work we use tungsten carbide cutters if we have only one piece to machine, and we find this profitable from many standpoints.

In the first place, the operator knows he can turn out a better job and produce a much better finish with a tungsten carbide cutter than he can with other cutters. Then again, as mentioned before, we often reduce the time of subsequent operations which amounts to a substantial saving. It is just as easy for an operator to get a tungsten carbide cutter from the crib as it would be to get any other cutter. There is no difference in set up time, but there is a gain if the work can be done more accurately and if the finish will be better.

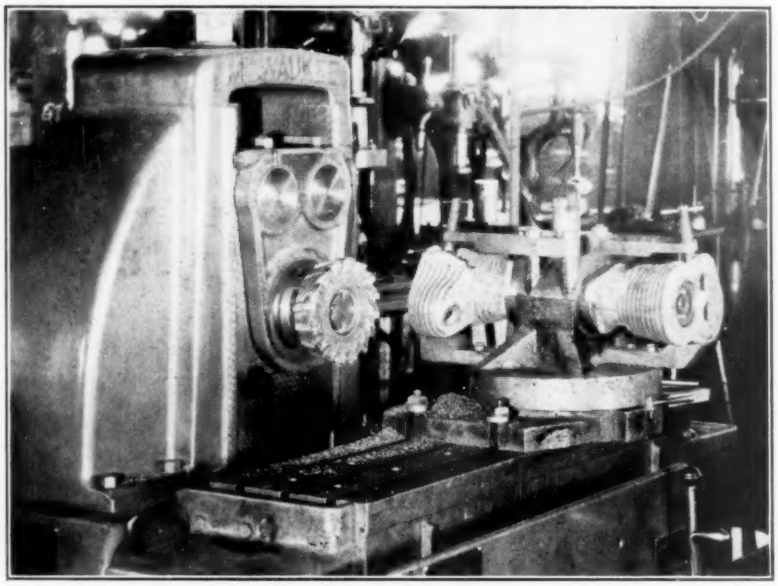
Naturally the most oustanding gain from tungsten carbide milling will be made from high production jobs, but at the same time it must be remembered that even where the runs are small there will be a gain that makes tungsten carbide milling profitable. Any plant that hesitates to use tungsten carbide for milling at this time, because of lack of volume, is merely postponing a task that may have to be done in the very near future.

Overcoming Prejudice

One of the most serious obstacles to overcome at this time is the early experience in using tungsten carbide for all forms of metal cutting. Some of these are not easily forgotten. Tungsten carbide was sold for many classes of work and for use in many types of machines that were totally unsuited for a cutting material of this kind. Failures existed and progress was seriously retarded. However, with the basic knowledge we have today, there is no real fear to overcome because results are practically assured.

Tungsten carbide is not a cure all by any means, but where this material can be used it should be applied without hesitancy.

There is no question that the machine tool is the most important consideration of a tungsten carbide application, and unfortunately this is sometimes overlooked. True enough, the tungsten carbide tool, the fixtures, and the work piece contribute generously to success, but the machine still remains the backbone.



This set up is for the milling of the cylinder head faces of cast-iron motorcycle cylinders. The cutter is 7 inches in diameter, and is operated at a speed of 305 feet per minute and a table feed of 26 feet per minute. The fixture is of the indexing type, so that one piece may be loaded while another piece is being milled. The depth of cut on this operation is approximately 3/32 inch. The machine is a No. 1230 Milwaukee Simplex.

TUNGSTEN CARBIDE

A Cost Slashing Weapon

By Frank W. Curtis, Research Engineer, Kearney and Trecker Corp., Milwaukee, Wis.

From a metallurgical standpoint, one of the most remarkable contributions to the metal-working industry is that of cemented tungsten carbide. When this super-cutting metal was introduced three years ago, very few engineers gave serious thought to its economical possibilities. Today, however, the value of tungsten carbide is universally recognized because it unquestionably serves a very definite purpose in industry. It has opened an entirely new field for high-production manufacture in that it permits the machining of metals at unheard-of speeds.

When high-speed steel was introduced, many years ago, there were various opinions as to its reliability. Some thought it was a "trick" metal that could not be made uniformly, although others were ardent supporters of the metal and made every effort to introduce its super-cutting qualities. The same condition is somewhat true with tungsten carbide, and it might be well said that we have been through the same cycle before. The problems encountered in developing and applying new cutting metals are not new, but in former days applied engineering was not heard of, as success was accomplished only in a traditional way.

The engineer's interest in tungsten carbide is quite obvious. His attention is usually focussed on the margin between selling prices and manufacturing costs, because where competition prevails the margin is, of course, lessened, and the cutting of costs becomes his measuring stick. In this direction, the engineer will find that tungsten carbide offers many advantageous uses.

Manufacturing Tungsten Carbide

The process of manufacturing tungsten carbide includes the preparation of extremely fine tungsten powder of high purity. These powders are carburized to produce tungsten carbide. Powdered metallic cobalt is then added, and the mixture is pressed in a steel mold under hydraulic pressure to form a blank or tip of desired size. This squeezing operation is done cold. The blank is then pre-sintered by a heat treatment that provides sufficient cohesion and forms a solid blank which can then be shaped or cut to various forms. The final operation is that of sintering at high temperature in a hydrogen furnace which produces the tungsten carbide blank ready for use. From this it will be seen that it is not steel in any sense of the word. It cannot be forged and it has no temper, which means that it does not respond to heat treatment.

Properties of Tungsten Carbide

The extreme hardness of tungsten carbide is perhaps its most commonly known property, ranking very close to that of the diamond. The density of tungsten carbide is about 60 per cent greater than that of steel. The coefficient of expansion is about one-half that of Invar, which is the least expansive steel known. The electrical conductivity of tungsten carbide is very low and its compression strength is greater than any other known material. Its tensile

strength, as determined by the transverse rupture test, is materially less than that of tool steel, varying between 200,000 and 350,000 pounds per square inch, depending upon the grade. On the other hand, its modulus in bending is almost three times that of steel.

The Effect on Industry

Perhaps the largest market affected by the introduction of tungsten carbide is the machine tool industry. Already there has been a number of market improvements in the design of machinery, and many manufacturers have developed special units suited to tungsten carbide. The outstanding improvements have been increased spindle speeds, increased feeds, and much more rigidity and strength than has heretofore been attempted. Considering the obsolescence brought about through the introduction of tungsten carbide, there is a market at the present time for more than $100,000,000.00 worth of machinery. The obsolescence of present machines is reached when they fail to earn the income that can be obtained with newer machines. It is not to be expected, however, that the change will be made over night. Replacement will be gradual — the newer machines crowding out older equipment, according to production demands. Although the ideal application of tungsten carbide is achieved by the use of a machine developed primarily for its use, it is quite reasonable to expect economical applications from machines already in use. The results with older machines will not be as satisfactory as those obtainable with new machines, but there will be economical advantages that will make the application of tungsten carbide profitable. There are two distinct economies to gain through tungsten carbide; one is greater production, and the other is increased tool life. Older machines have a greater tendency to increase tool life and in some cases offer a slightly greater output, whereas the newer machines offer unusually increased output as well as tool life.

NOTICE

Following the June issue of the A.S.T.E. Journal we received many calls from members to the effect that they did not get their copy or that it was delayed in delivery. The entire issue was delivered to mail at the same time, therefore we believe the delay must have been caused by incomplete addresses or errors in addressing.

We are using a different system of mailing on the July issue and would appreciate information from members relative to the promptness of delivery of the July issue.

The Publicity Committee

KEEPING DRAWINGS CLEAN

Washing celluloid triangles, templets and curves in lukewarm, soapy water at regular intervals will keep drawings clean and neat. Constant sliding over the drawing causes these tools to become soiled with graphite and subsequently to smudge the drawing.

P. F. Rossmann

"Pop, will I look like you, when I grow up?"

"Everybody says you will, my boy."

"Well, I won't have to grow up for a long time, will I Pop?"

* * *

Andy was busily engaged with a spade in the mud beside his car when a stranger hailed him. "Stuck in the mud?"

"Oh, no!" replied Andy cheerily. "My engine died here, and I'm digging a grave for it!"

* * *

Customer: "Three of those apples you sent me were rotten. I am bringing them back."

Storekeeper: "That's all right, madam. You needn't bring them back. Your word is just as good as the apples."

* * *

"Now", the lecturer asked, "is there any man in the audience who would let his wife be slandered and say nothing? If so, stand up."

A meek little man in the rear rose to his feet.

"What," roared the lecturer, "would you let your wife be slandered and say nothing?"

"Oh, I'm sorry," replied the meek man, "I thought you said slaughtered."

* * *

Police Chief: "What! You mean to say this fellow choked a woman to death in a cabaret in front of two hundred people and nobody interfered?"

Cop: "Yes, Cap, everybody thought they were dancin'."

* * *

Ed: "I guess you've been out with worse looking fellows than I am, haven't you?"

No answer.

Ed: "I say, I guess you've been out with worse looking fellows than I am, haven't you?"

Co-ed: "I heard you the first time. I was just trying to think."

* * *

The Gossip: "I hear your store was robbed last night. Lose much?"

The Optimist: "Some. But it would have been worse if the yeggs had got in the night before. You see, yesterday I just finished marking down everything 20 per cent."

* * *

Take advantage of the little opportunities and you won't need to wait for a big one.

Much of the time it isn't what we would like to do but what we must do.

The struggle for existence keeps many of us busy and out of trouble.

It costs a great deal to maintain one's dignity, but maybe it's worth it.

In money matters the man who is ruled by his emotions instead of his reason is soon broke.

It's funny how a woman usually gets a headache and collapses about five o'clock of the maid's day off.

The purchasers of high quality goods get the most for their money.

It's well to have a few definite convictions so that you won't have to think twice about everything.

RECOMMENDED SPEEDS and FEEDS

SPEEDS...

Based on our broad experience with Tungsten and Tantalum Carbide milling, we recommend the following cutter speeds which are listed in FEET PER MINUTE. These speeds are based on the cutting characteristics of various metals. These speeds are safe speeds, but it may be necessary to alter them, one way or another, to suit particular cases.

With all conditions favorable . . . for instance:
a rigid set-up . . .
free-cutting material . . .
and a machine in good operating condition . . .
these speeds may be increased slightly.

Under conditions not so favorable . . . for instance:
with hard material . . .
lack of rigidity in the set-up . . .
and a milling machine not in the best of condition
. . . a suitable reduction will have to be made.

To determine how much speed the cutters will stand, start slowly and increase the speed gradually.

TABLE OF CUTTING SPEEDS FOR TC MILLING IN FEET PER MINUTE

Material to be milled	ROUGHING		FINISHING
	Over 1/8 in. depth of cut	Under 1/8" depth of cut	Under 1/16" depth of cut
Cast iron, soft	200- 250	250- 325	300- 400
Cast iron, medium	150- 200	200- 250	250- 300
Cast iron, hard	100- 125	125- 175	150- 250
†Malleable iron	225- 300	250- 350	350- 450
†*Cast Steel	100- 200	150- 250	200- 300
†*Low Carb. Steel, soft.	150- 200	175- 250	200- 350
†*Low Carb. Steel, med.	100- 150	150- 225	175- 250
†*Low Carb. Steel, hard	75- 100	100- 150	150- 200
Yellow Brass	300- 400	350- 500	400- 600
Ordinary Bronze	200- 300	250- 350	350- 500
†Aluminum	800-1200	1000-1500	1500-2000

† Use Coolant * Tantalum Carbide

FEEDS...

The only efficient way to determine the Feed per Minute of a milling cutter is from the Feed per Tooth per Revolution. No other method is quite as effective. From our long experience with milling operations of all kind, we have found that the Feed per Tooth per Revolution of a milling cutter has a direct relation to cutter life.

Too much feed overloads the teeth of the cutter, and very often causes breakage. With too fine a feed, excessive wear takes place because the teeth have to pass in contact with the work more often for a given length of cut than is necessary.

Be very careful not to overload the machine. Sometimes a heavy set-up may be handled in a machine somewhat light for the cut, in which case the cutter should not be run at maximum feed, because an overload will result. When the cut being taken is exceptionally wide, it is often necessary to reduce the Feed per Tooth per Revolution to avoid an overload.

A practical method of arriving at the proper feed for a given cut is to . . . OPERATE THE CUTTER AT THE CORRECT SPEED AND APPLY AS MUCH FEED AS A COMBINATION OF THE CUTTER, THE MACHINE, AND THE WORKPIECE WILL STAND WITHOUT INJURY TO ANY ONE OF THESE FACTORS.

The following table lists the recommended Feeds (per Tooth per Revolution).

TABLE OF FEEDS (Per Tooth Per Revolution) FOR TC MILLING

Material to be Milled	Roughing Depth ⅛-3/16 in.	Semi-Finishing Depth 1/16-⅛ in.	Finishing Depth 1/16 or under
Cast Iron	0.008-0.010	0.009-0.014	0.006-0.008
Malleable Iron	0.008-0.010	0.009-0.014	0.006-0.008
Brass	0.010-0.012	0,012-0.016	0.008-0.010
Bronze	0.010-0.012	0,012-0.016	0.008-0.010
Aluminum	0.004-0.007	0.005-0.007	0.003-0.006
Steel	0.004-0.008	0.005-0.009	0.003-0.006

Increase finishing feeds according to smoothness of surface desired.

EXAMPLES:

Here are two examples which explain the use of these Speed and Feed Tables.

EXAMPLE No. 1: What should be the Table Feed per Minute and the proper Speed for a 5-in. cutter having 10 teeth, to be used for milling soft cast iron on which the depth of cut is ⅛-inch? By referring to the Table of Cutting Speeds, we find that 250 to 325 ft. per minute is recommended for a cut of this kind. Therefore, assuming that 300 ft. per minute would be most practical, the first factor to determine would be the r.p.m. of the cutter. Referring to Formula No. 1, shown below, we find that the r.p.m. is determined by dividing the Feet per Minute by the circumference of the cutter. The circumference of a 5-in. cutter is equal to 5x3.1416, or 1.31 ft. Then, dividing the desired speed of 300 ft. per minute by 1.31 ft., the result would be 229 r.p.m.

Now, referring to the Table of Feeds, we find that the recommended Feed per Tooth per Revolution for a cut of this kind would be from 0.008 to 0.010 in. Assuming that the smallest feed would be best, we then multiply the teeth per minute by 0.008 in. The teeth per minute would be obtained by multiplying the number of teeth in the cutter by the r.p.m., which would be 10x229, or 2290, see Formula No. 4. So for our answer we would have 2290x0.008 in. per tooth, which would indicate a Table Feed of 18.3 in. per minute.

EXAMPLE No. 2: Suppose an 8-in. cutter having 18 teeth, was intended to finish aluminum at 1500 ft. per minute, and that a Feed per Tooth per Revolution of 0.004 in. was found to be best for the nature of the cut. This problem would be worked out in a very similar manner. First, we would determine the circumference of the cutter in feet, which would be equivalent to 8 multiplied by 3.1416, divided by 12, which would equal 2.1 ft. The recommended Feet per Minute, divided by the circumference, would be equal to the r.p.m., which in this case would be 1500 divided by 2.1, which would equal 715 r.p.m. Now then, taking our Feed per Tooth per Revolution, and using Formula No. 4, shown below, we would have: 0.004x18x715 equals 51.5 in. Table Feed per Minute.

The following formulae will be of assistance in calculating speeds and feeds of milling cutters in which certain factors are known and others are to be determined.

	To Find	Having	Rule	Formula
Formula No. 1	Revolutions Per Minute	Feet per Minute and Diam. of Cutter	Feet per Minute, divided by circumference of cutter	$FPM \div \frac{\text{Diam. x pi}}{12} = RPM$
Formula No. 2	Speed of Cutter in feet per Minute	Diameter of cutter and R.P.M.	Diameter of cutter, multiplied by 3.1416, multiplied by R.P.M. divided by 12	$\frac{\text{Diam. x pi x RPM}}{12} = FPM$
Formula No. 3	Feed per tooth per revolution	Feed per Minute and No. of teeth per minute	Feed per Min. (in.) divided by No. of teeth per Min. (No. of teeth in cutter x R.P.M.)	$F \div (TxRPM) = FTR$
Formula No. 4	Feed per Minute	Feed per tooth per rev., No. of teeth in cutter and R.P.M.	Feed per tooth per Rev., multiplied by No. of teeth in cutter multiplied by R.P.M.	$FTRxTxRPM = F$

FPM = Feet per minute FTR = Feed per tooth per revolution pi = 3.1416
RPM = Revolutions per minute T = Number of teeth in cutter. F = Table feed per minute

EDITORIAL PAGE

X-RAYING THE TOOL ENGINEER

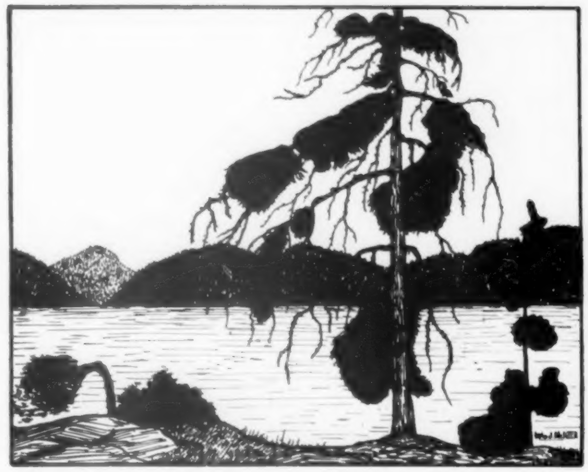
MOST persons fail to analyze their motives. That is, they seldom attempt to determine why they do whatever they do. They know they have reasons for their actions, but when asked "why" they often find themselves plumbing the depths of their conflicting wants, unable to determine definitely just what real desire prompted the action in question.

One must do a really remarkable piece of analyzing if he is to determine precisely the motive back of his action. If you doubt this, just try it a few times. You'll gain some valuable experience, and learn some secrets about yourself. A person must be absolutely fearless if he is to learn thus to analyze himself. Most of us go through life hoodwinking ourselves. If we do discover the real motive back of our action we are afraid to admit it even to ourselves.

Each one thinks he is able to hide from all others the fact that he did what he did just because he thought his action would bring him profit. Why is man such a coward when it comes to admitting that he does a thing to profit himself? Selfishness, properly tempered, is to man what properly mixed gas is to an automobile. It supplies the pep—the motive force for most of our actions.

Of course, it is not intended that the foregoing should convey the impression that anyone would blush if asked why he became a member of the American Society of Tool Engineers. Nor is it likely that any member would find himself unable to determine why he joined. Obviously, anyone doing tool engineering, or anyone aspiring to become a tool engineer, could hardly find a reason for not becoming affiliated with the only organization of tool engineers in existence. However, it would be decidedly interesting and very helpful to the directors and the ones who plan the meetings and prepare the JOURNAL if they could learn definitely all the reasons prompting each member to join.

There can certainly be no doubt of the fact that there is one want that is common to all members. The fulfillment of this desire is an all-sufficient reason for the rapid growth of our membership. The soul of the society is the urge of each member to



either become a better tool engineer, or in case of the junior, to become a tool engineer. Surely this is a worthy motive, but how is the society going about the task of distributing this knowledge to its members? First of all, a decision must be made as to what bits of information must be put together to make the intricate pattern comprising the total amount of knowledge a tool engineer must possess. The present boundary line must be clearly marked. What a tool engineer is supposed to know, or do, or be, is not set forth in a dictionary.

Since he usually has the tool designing department under his supervision, it is generally conceded that he must be a draftsman and tool designer. In general, it seems that one of his diversified duties is operation planning, hence we agree that he must be thoroughly informed as to manufacturing methods and costs, tool building and tool costs.

Most of us will agree that a tool engineer has certain executive duties to discharge. It has been said that the success of an executive depends upon his ability to organize, deputize, and supervise. The most important function of tool engineering is planning, processing, or organizing. To organize is to "get into working order; to arrange methodically, to reduce to a method". A high percentage of the tool engineer's work consists in "arranging methodically" (organizing) the factory, especially the machinery and tools, so that a product can be manufactured profitably. Since the organizing must be so accomplished that a profit ensues, the tool engineer must know something of economics.

Professor Roe* says that in dealing with fixtures, the economic problem centers on answering one or more of the following questions:

"1. How many pieces must be run to pay for a fixture of given estimated cost, which will show a given estimated saving in direct-labor cost per piece?

"2. How much may a fixture cost which will show a given estimated unit saving in direct-labor cost on a given number of pieces?

"3. How long will it take a proposed fixture, under given conditions, to pay for itself, carrying its fixed charges while so doing?

"4. What will be the profit earned by a fixture, of a given cost, for an estimated unit saving in direct-labor cost and given output?"

Judgment will no longer suffice in the answering of these questions. Many factors enter into the correct, businesslike answers. Several lengthy formulas involving many factors are involved in the solution.

Tool engineering is a hybrid sprout; a cross section between mechanical, industrial, and "efficiency" engineering. It's just a bud, almost without a past; a profession in the embryo — not thirty years old. However it is described today, its character will be different tomorrow. Even the ancient trades and professions changed with the endless procession of the years. Tool engineering is what its environment has made it, and its environment is changing daily. The cedar of Lebanon isn't the cedar of North America, nor are all the cedars of North America identical. Environment (climate and soil) affect its physical appearance, but fundamentally it is the same. It is a member of the fir family wherever it is found. But the fir family is an old family, while the lineage of tool engineering is abbreviated.

If each tool engineer member of our society were to write a careful outline of his duties, and we could compare all of these outlines, some of us would be shocked at their lack of uniformity. The duties of no two of them would be found to be identical. Of course, some variation in their duties would be expected because of the variety of articles being manufactured and the resultant variation in method. But there would also be found a variation which could not be accounted for in this manner. There is a glaring lack of similarity in the duties of individuals recorded on the payrolls of companies as tool engineers, even where companies are engaged in manufacturing the same product. In one plant a tool trouble man is called a tool engineer. In another plant two miles distant, a man carrying the title of assistant master mechanic spends his entire time doing tool engineering, that is, specifying operation layouts, machines, tools, and dies. Certainly, neither the employer nor the employee profits by such a lack of standard practice.

The organizers of the American Society of Tool Engineers were forced to make up a definition of "tool engineer". It is now time for the abbreviated description to be considerably enlarged upon, so that the manufacturing world may know definitely what a tool engineer is by the duties he performs today, to the end that his duties in the future may lie within more definite boundary lines. For how can a man prepare for a job if he doesn't know what duties he is to perform? The position is one of such responsibility that the manufacturer must insist upon a highly trained specialist.

It is time to cease theorizing about what an ideal tool engineer should be. Let's lay aside the rose tinted glasses and view the upstart in his real colors. After observing his wriggling and squirming under the microscope we may discover what ails him. We may learn that most of his ills are "growing pains". At any rate, the policy most certain to lift him to a higher plane in the scale of professions is to first discover exactly the kind of creature he is, so that proper recommendations may be made as to what must be done to make him what he wants to be.

Is there any better way to inform one another, or to "tell the world" what tool engineering is, and begin the process of standardization, than for each member now recorded on the roster of some company as "tool engineer" to write out with the greatest possible care and precision an exact and complete outline of all the duties he is required to discharge, so that all these descriptions can be published in the JOURNAL?

Please start them coming in at once. Make them complete to the smallest detail, as an engineering report should be. Each will be published, with or without your name, as you specify.

* Joseph W. Roe, Professor of Industrial Engineering, New York University.

Johnny: "I didn't bring any excuse for being absent 'cause ma was too busy to write one this morning"

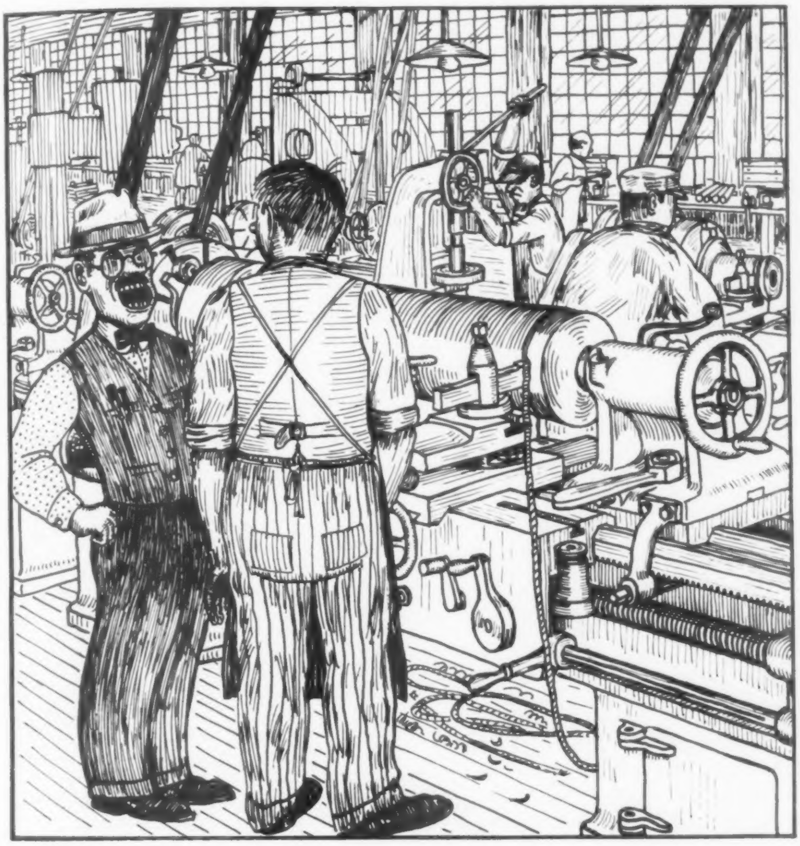
Teacher: "Then why didn't your father write one?"

Johnny: "Shucks, he's no good making excuses. Ma catches him every time, an' you're smarter'n ma."

NOT GUILTY

Barber: "Haven't I shaved you before, sir?"
Customer: "No, I got these scars in France."

THE EFFICIENCY MAN



Efficiency Man:—You won't last long 'round here taking stock off at that rate—Don't you know how to take a cut? Here, I'll show you (Pushes Lathe hand aside and feeds tool in)

Ten minutes later
Efficiency Man: — Well, that's taking it off a little faster.
New Lathe hand: — I guess so, but——

——I'm afraid it'll be a little under size. That was the finish cut I was taking.

"Reaming" in a Punch Press

By F. E. Shailor

Maintaining close limits in reamed holes in aluminum or bronze, particularly aluminum, introduces a high up-keep in reamer costs. Where the nature of the work will permit, it will be found that closer limits can be maintained and a far greater output of parts per reamer cost will result by roughing out the hole to within a few thousandths and then sizing the hole by forcing a smooth solid steel plug through the hole. This is done preferably in the punch press by providing proper resting for the part to be sized, a proper lubricant, and suitable stripper arrangement for removing work from the plug.

The exact size of the plug must be determined by trial, as the hole "closes" slightly upon the removal of the plug. In sizing a hole say one inch in diameter, 1.0015" would be close to the finish plug size. When properly lubricated the plug left soft, answers as well as a hardened plug. When finishing the plug, the lapping or polishing should be done lengthwise of the plug to prevent circular ridges that tend to pick up the metal in the hole.

Sizing with a solid plug that floats in the ram produces a compact, mirror like surface in the hole.

Announcements

Harry M. Adams (charter member), formerly with Plymouth Motor Car Co., is now with Welch Tool Co. as Sales Engineer.

General offices and plant of the Mallory Electric Corp. have been moved from Toledo to Detroit. The new address is Vancouver Ave. and P. M. R. R.

John E. Livingstone Co., General Motors Bldg., Detroit, has been appointed sales agent by Robbins & Myers, Inc., for hoists and cranes.

D. S. Harder, works manager of the Edward G. Budd Company's Detroit plant, has been made works manager of the Philadelphia Plant as well, and has gone to that city. LeRoy A. Coleman is production supervisor at Detroit.

This issue of the JOURNAL contains the two first data sheets of a series which will be continued. This leaf is perforated so that it can be removed and filed until the series is complete.

"PULL YOUR WEIGHT"

The letter and article printed below were received from Mr. R. B. Luchars, President of The Industrial Press. These were discussed at the June 9th meeting, and at a directors' meeting on June 16th it was decided to publish the letter and article in the July issue of the JOURNAL.

Permission has been obtained from Machinery.

Machinery

June 1, 1932

Mr. A. M. Sargent,
Detroit, Mich.

Dear Sir:-

It has been the traditional practice of the average man of industry, the country over, to avoid mixing into politics and it has been the traditional policy of this paper, in the thirty-eight years of its existence, to avoid the discussion of political questions. We believe that the time has come for men of industry and industrial publications to make an exception to this rule, for the issue before us is perhaps the greatest this country has ever had to face.

It is in fact no longer a political issue. It is a national crisis which concerns every man, regardless of position, whose ability to earn a living depends on industry's ability to operate. The millions of people whose rights are being utterly neglected must raise their voices in vehement protest. We cannot sit back and expect someone else to do this job for us. It is up to everyone of us. If we want Congress to listen we must make this a personal issue and lend a hand. It is the cumulative pressure that counts.

If you agree with the sentiments expressed in the enclosed article, will you help spread the word?

Sincerely yours,

R. B. LUCHARS,
President

RBL:LH
1 enclosure

Pull Your Weight

In a shipwrecked crew every man is expected to pull his weight. This country isn't shipwrecked yet, but it is likely to be if Congress is not brought to its senses. And that's our job—yours and mine and that of every other man whose livelihood is hooked up to industry. We must tell our Congressmen to stop playing politics and do the common-sense things that will help establish a basis for business recovery.

Business men generally recognize the fact that this country is facing a grave crisis from which the swing will either be gradually up or sharply down. It is obviously unreasonable to expect Congress to find an immediate cure for the depression, but is it too much to ask that it refrain from action that pushes us down deeper into the depths and that attention be concentrated on the simple program most likely to help restore confidence—a program of drastic economy and sound revenue measures that will keep the Government solvent?

That means a substantial cut from the prosperity level of Government expenses. It means that pensions for people who don't deserve them and other raids on the Treasury must be stopped. We are in no mood to see our money, which must be squeezed out of badly battered incomes, flung recklessly to any group of pretended patriots whose claims are flimsy but whose votes look real.

When liberty and national welfare were at stake, back in 1917, there weren't many who were too proud or too indifferent to fight. Why are we now? The issue rises above party and class. Our rights—the rights of the millions of people in the nation's industries—are being trampled upon by self-seeking, organized minorities.

It is time for the majority to demand their rights. It is time to act! Not next week or next month, but now. Pull your weight in the boat by writing and getting all your friends and associates to write to your Senators and Congressmen.

R. B. LUCHARS,

President The Industrial Press

Tool Engineering Bulletin No. 1

NAMES OF THE VARIOUS ELEMENTS OF DRILLS
TERMINOLOGY.

There exists some confusion among users of tools as to the proper names or designations of the various elements of Drills. To clarify this point, and for the convenience of the readers of this Bulletin, the following explanations are made:

1. OVERALL LENGTH is the length from the back end to the corner of the cutting lips. It does not include the conical cutting point.
2. FLUTE LENGTH is the length from the corner of the cutting lips to the extreme back end of the flute. This is sometimes referred to as the Length of Twist.
3. FLUTES are the spiral grooves cut or formed to provide cutting edges, to provide clearance for chips and to allow coolant to reach the cutting edges.
4. CLEARANCE is that portion of the drill body that has been cut away so it will not rub against the walls of the hole. This is to reduce friction.
5. LANDS are the portions of the drill body between the flutes. They provide strength and rigidity to the drill.
6. MARGINS are the narrow parts along the cutting edges of the drill flutes that determine the diameter of the drill.
7. WEB is the central portion that separates the flutes of a drill. The extreme end of the web forms the —
8. CHISEL EDGE, which is the non-cutting portion of the drill point. The recommended angle of this edge with the cutting lip is 135 degrees.
9. SPIRAL ANGLE is the angle of the flute with the axis of the drill. If this angle is small the drill is said to have a slow spiral. If the angle is comparatively great the drill is said to have a fast spiral.
10. LIPS are the cutting edges of a drill.
11. POINT ANGLE is the included angle between the lips. It is usually 118 degrees on standard drills.
12. POINT OR LIP CLEARANCE is the clearance back of the cutting edges or lips. It usually varies between 7 degrees and 12 degrees.
13. BACK TAPER. All drills, except the very small ones, are made slightly smaller at the back end of the flutes than at the point. This is called back taper. The amount of back taper is usually about .0005 per inch length.

Courtesy of National Twist Drill & Tool Co., Detroit
C. J. OXFORD

Tool Engineering Bulletin No. 2

SPEEDS AND FEEDS FOR DRILLS

High Speed Steel Drills

Size of Drill	Feed Per Rev.	Bronze Brass 300 Feet	Alloy St. Drop Forging 50 Feet	Cast Iron 140 Feet	Tool St. & Car. St. Drop Forging 60 Ft.	Mild Steel 120 Feet	Malleable Iron 90 Feet	Cast Steel 40 Feet	Cast Iron Hard 80 Feet
Inches	Inches	RPM	RPM	RPM	RPM	RPM	RPM	RPM	RPM
1/16	.003	18320	3056	8554	3667	7328	5500	2445	4889
3/32	.0035	12212	2038	5702	2442	4884	3666	1628	3258
1/8	.0040	9160	1528	4278	1833	3667	2750	1222	2445
5/32	.0045	7328	1221	3420	1465	2934	2198	976	1954
3/16	.005	6106	1019	2852	1222	2445	1833	815	1630
7/32	.0055	5234	872	2444	1047	2094	1570	698	1396
1/4	.006	4575	764	2139	917	1833	1375	611	1222
9/32	.0065	4071	678	1900	814	1628	1222	542	1084
5/16	.007	3660	611	1711	733	1467	1100	489	978
11/32	.0075	3330	555	1554	666	1332	1000	444	888
3/8	.008	3050	509	1426	611	1222	917	407	815
13/32	.0085	2818	469	1316	563	1126	846	376	752
7/16	.009	2614	437	1222	524	1048	786	349	698
15/32	.0095	2442	407	1140	488	976	732	326	652
1/2	.010	2287	382	1070	458	917	688	306	611
9/16	.0105	2035	339	950	407	814	611	271	543
5/8	.011	1830	306	856	367	733	550	244	489
11/16	.0115	1665	277	777	333	666	500	222	444
3/4	.012	1525	255	713	306	611	458	204	407
13/16	.0125	1409	234	658	281	562	423	188	376
7/8	.013	1307	218	611	262	524	393	175	349
15/16	.0135	1221	203	570	244	488	366	163	326
1"	.014	1143	191	535	229	458	344	153	306
1-1/8	.015	1017	170	475	204	407	306	136	272
1-1/4	.016	915	153	428	183	367	275	122	244
1-3/8	.016	833	139	389	167	333	250	111	222
1-1/2	.016	762	127	357	153	306	229	102	204
1-5/8	.016	705	118	329	141	282	212	94	188
1-3/4	.016	654	109	306	131	262	196	87	175
1-7/8	.016	610	102	285	122	244	183	81	163
2"	.016	571	95	267	115	229	172	76	153

Carbon Drills will have same feed per revolution as High Speed Drills.
R.P.M. and S.F.M. will be 50% of amount for High Speed Drills.

Courtesy of C. J. Oxford.

National Twist Drill & Tool Co.
Detroit, Mich.

THE SALES ENGINEER

Some Meditations and a Bit of a Story

By JAMES B. GIERN

The following lines are written by a person who has spent a good many years on sometimes this side of the fence, and then some on the other; that is, he has been both the buyer and the seller of tools and equipment.

Your author, competent as he is to view both sides of the coin, may be criticised for partisanship. Be that as it may, his aim is towards the constructive; if he fails in that direction, then it is not on account of will, but lack of ability.

Past, Present, and Future.

The sales engineer is rather a new constellation—what was he yesterday?

Enter Salesman, the hail fellow well-met-slap-on-the- back-have-a-cigar-have-you-heard-the-one-about-the - Scotchman - in - the - ditch-stop-me-if-you-heard-fellow.

He is a good hand shaker, he has a winning personality — he is a good guy.

He generally knows 00.000 about his subject; he just represents his "house" — he keeps the name before the public, meaning us.

He takes up our time; more than often he does not know when to terminate the visit, but we forgive him because he is a good guy.

But as before mentioned, all that was yesterday; that situation simply "ain't" any more.

In fact, he has been reduced to a "thumb jerker" today.

It's the depression again; ah no, my friends, not exactly—the movement started a few years ago. The fact is, a good many shop experts found themselves inspired to go on the road—inspired as I say, just by that incompetent chatter they had endured for so many years, thinking—and rightly thinking — that factory officials would rather discuss points of merit with an expert, with an equal.

Please do not construe my remarks to mean that there were NO competent salesmen — there were, and there are yet, some even without actual engineering experience, but they have drummed their line so long that they have acquired quite a smattering of knowledge. I have no quarrel with him. The fellow I have in mind is the professional salesman, the product of a sales school, or such, the boy who tries this line or that line, anything that looks promising.

But as before mentioned, reforms are not made, they are spontaneous. And thus the sales engineer was born. First and foremost, the sales engineer must be a counsellor, an expert adviser.

If he always bears this in mind, then he will always be welcomed, in fact, he will be sent for, and his words will be listened to every time a new job is in sight.

He should survey the work as though he were to make it, as though it were his responsibility. He should willingly admit that his dope is not suitable, but recommend so and so—even if it be a competitive article.

He knows his competitor's article, whereas his customer does not, but expects the information from the sales engineer.

Again, he should be an expert and a pilot.

After all, it is the confidence you have in the man that makes you turn the work and the helm over to him.

He sold you on his experience—would he have sold you if after dumping the goods in your receiving room his responsibility would cease?

He would not.

As a matter of fact, his sale is not put across before the very machine operator is satisfied.

Yet, here I believe a word of caution is in order.

The fact is—enthusiastic as the sales engineer is, over confident and accommodating, sometimes over rating and sometimes promising the impossible both on his own part and his concern's — all this may prove expensive.

For example, the buyer should bear in mind, and must do, that expensive experiments and excessive service is a burden for a time borne by the seller, but eventually charged to the buyer.

But happily, this condition is also rapidly disappearing as the true co-operation — that is, as one engineer to another—is progressing.

The experience gathering, on one hand, and dispensing, on the other, is to a large extent the result of his daily visits in plants and his faculty of observation. This would at first glance seem a breach of etiquette — but on second thought it will be realized that operations successful in diverse shops are never entirely alike, and if an operation is successful in one factory, more than likely its application in another concern fits an altogether different job.

This is only tending to help the industry as a whole.

AND—indiscretion on the part of the sales engineer is a moral crime.

Now for a little advice, although I will say that this particular advice is not near as applicable to the sales engineer, who never forgets his shop days, as to the salesman.

One often hears, "General Machine Co.—why sure, I'll sell them—I know so and so, he is the vice-president."

Right here is one of the most fatal stumbling blocks —for in the General Machine Co. is but **one** man who is the proper man for the sales engineer to deal with—why not go directly to him, whether you know him or not; the girl in the front office will direct you.

The sales engineer gains little or nothing in having a superior officer introduce him to the right party—it smacks of condescending and going over some party's head, and it does not pay any dividends.

(To be continued)

DIRECTORS' MEETING

A special meeting of the Board of Directors was held Thursday, June 15, 1932. Twenty-three members of the directorate were present.

The entire evening was devoted to a discussion of various matters of business.

A motion was made to reduce the entrance fee to $3.00 for the balance of the year 1932. After a serious discussion, it was voted to adopt the resolution.

It was reported that some of the members received their copy of the magazine after the date of the monthly society meeting. The publicity committee will endeavor to rectify this delay by publishing the magazine one week earlier.

A NICE SWEET JOB.

An Irishman who worked for the city came home one evening after a very hot summer's day and began to kick at his wife for not having his supper ready.

"What do yes mane by talkin' to me that way?" she said to him. "Here I am all day slavin' me health an' strength away over the washtub on a hot day like this, and you down in you nice, cool sewer".

Report of Button Committee

A. S. T. E. buttons have been ordered and will be on sale at the door at the next regular meeting, by members of the emblem committee. They will be available thereafter through the office of the secretary.

Gold filled buttons are priced at $1.00, and solid gold, at $2.00.

Buttons with the blue background are for senior members, and with maroon background for juniors.

Let us all wear the emblem and thereby arouse interest which will result in new members.

Fred L. Hoffman,
Chairman Emblem Committee

ODDITIES

I had occasion to check a design of a reamer on which the man wanted .010 land, but the drawing called for .010 fields.

A tool designer of Swedish descent was asked to design a fixture for a grinder. When he had completed it, he submitted it to the chief designer, who, reading the title, saw the following: "Used on Caution Grinder". He questioned the designer and found that he had got the name from the brass plate on the machine. The chief sent the man down again to get the correct name of the machine, and he returned saying: "I found dot name on de brass plate. It say, "Caution, use light oil."

F. L. H.

Today's follies are tomorrow's conventions.

Observations by Toolsmith

I was present when the president of an engineering college dismissed the students.

"Now remember, boys", he said, "Do not spend your midnight oil racking your brains for new inventions; rather give a lot of attention to existing matters and improve them — nothing man made is perfect." Sound advice! Many a good improvement, for example, the steam engine, is better than a useless invention.

In China where writing is holy, printed paper, even foreign, is treated with respect. It is never profanely used; in fact, it is carefully gathered and burned in a pagoda to the accompaniment of music. A very sensible habit — imagine if that was our custom! What a lot of rot would then be unpublished, and what a lot more wisdom we would read and absorb.

Some time ago, a Detroit newspaper printed an article about the famous sea battle between the Merrimac and the tiny Monitor, the incident that turned the table. For some reason, or maybe for no reason at all, the author did not mention John Ericsson. But let me tell you, Boys and Girls (apologies, Mr. Gibbons), John had a devil of a time selling the wise birds in Washington on the idea.

THAT was once that the day was saved by an engineer.

Let us hope!

By the way, did you ever give a thought to the humble kitchen mechanic and her tools?

Is it not remarkable that so few real improvements have been made in this equipment — measured, of course, by the innovations in other lines?

Must be that cooking is a rather old and settled trade.

They say "silence is gold". I suppose that's why all the holler is about silver.

If necessity is the MOTHER of invention — then GENIUS is the dady.

J. B. G.

Foozello: I'm sorry that my engagements prevent my attending your charity concert, but I shall be with you in spirit.

Solicitor: Splendid! And where would you like your spirit to sit? I have tickets for two, three, and five dollars.

Teacher: Who was the world's smartest man?

Boy: Thomas Edison. He invented the phonograph and radio so that people would stay up all night and use his electric light bulbs.

Strength of Materials

J. M. CHRISTMAN
P. F. ROSSMANN

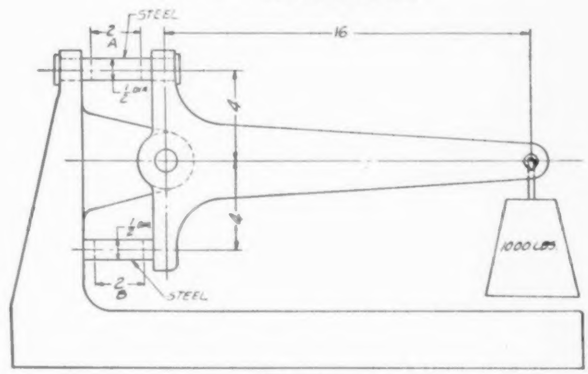


Fig. 1

In figure I a weight of 1000 pounds is applied at the end of the beam. How much will length A stretch and length B compress, neglecting any change in the supporting structure or the beam?

SOLUTION:

$$\text{Area} = \tfrac{1}{2} \times \tfrac{1}{2} \times .7854 = .1964$$

$$\frac{1}{29000000} \times 2 \div .1964 \times \frac{16}{4} \times 1000 \times \frac{1}{2} \text{ or}$$

$$.000000034 \times 2 \div .1964 \times \frac{16}{4} \times 1000 \times \frac{1}{2} = .0007$$

STRENGTH

Pat was making a visit to the old country, and the second day out on the ocean the ship encountered rough weather. The Captain saw Pat lined up along the rail with several other sea sick passengers and slapping him on the back said, "Why Pat! I thought you had a strong stomach".

"By gorra, I 'ave got; I'm heaving it as far as any of 'em".

THIS IS THE LAW

Live cleanly.

Eat wisely.

Sleep adequately.

Exercise regularly.

Study methodically.

Save systematically.

Invest judiciously.

So — and only so — may you attain health, wealth and wisdom, if you have them not; or retain them if you have them now.

No exceptions can, or will, occur. No half-way measures will suffice. No intuitions, however good, will compensate. None but those who obey these dictates may live — happily. The rest must fail, in one way or another.

Inexcusable, harsh, unyielding, cruel, perhaps, but nevertheless:

It is the law! —The Magazine of Wall Street.

The Monstrosity

Perhaps it is generally thought that the editorial committee has its skeleton on the outside of its body, like a crab, so that its blushes occasioned by begging and wheedling for help are covered. It has been hinted that its organs of taste, like those of the fly, seem to be located in its feet.

If it were also hydra-headed; had myriads of grasping octopus arms; fourteen hundred teeth, like a snail; insides like a blast furnace; eyes as numerous as the stars that twinkle on the Milky Way; and the wings of an eagle, it could—to the infinite delight of its energetic fellow members — soar to the highest heights of the Rocky Mountains and from thence, stretching forth its mighty arms to the far away sources of tool engineering information, tasting it with its feet and drawing the best into its mighty stone-crusher jaws, there grinding it to powder, and melting it in its infernal bowels, write upon the broad canopy of the heavens, in flaming words of fire, a journal for your edification.

Get the idea? — We need help!

The publishers of MACHINERY say that about half of the matter published in that magazine is sent in by men working in designing departments or shops. They are not professional writers. The editorial staff supplies only about ten per cent of the material.

All contributors, as well as the editorial staff of MACHINERY are paid in coin of the realm for their services. A part of the pay you will receive for your contribution to the JOURNAL will be the good will and thanks of those who enjoy reading your contribution. A part of the remainder of your salary will be the satisfying thought that you've helped a good cause, and the knowledge that you have strengthened yourself by the exertion. The balance of your reward will filter through the abysmal, imponderable, all pervading reaches of ether to comfort your departed soul. No other salaries paid on earth can reach you there.

If you don't send it in pretty soon, the editorial committee will, through necessity, become the boogey man described above — and the boogey man'll get you if you don't watch out!

HABERKORN & WOOD, 2208 West Fort Street, Detroit, have been appointed exclusive representatives in the Detroit territory on PROVIDENCE ENGINEERING WORKS' complete line of High Speed Drilling Machines.

Some class to the meetings committee. June 27 at the Detroit Yacht Club.

Sailing at 6.

Dinner at 8.

Meeting at 8:30.

PASS THE ASBESTOS SPOONS

A colored preacher down South was trying to explain the fury of Hell to his congregation.

"You all is seen molten iron runnin' out from a furnace, ain't you?" he asked.

The congregation said it had.

"Well", the preacher continued, "dey uses dat stuff fo' ice-cream in de place what I'm talking bout".

* * *

Doctor:—Did the patient take the medicine I prescribed for him religiously?

Nurse—No, sir; he swore every time.

* * *

"When I left college I didn't owe anyone a cent."

"Dear me, what an unfortunate time to leave."—Annapolis Log.

* * *

After matrimony: "All that I am, I owe to you."

After alimony: "All that I have, I owe to you."—Reserve Red Coat.

* * *

Wife—The couple next door seem to be very devoted. He kisses her every time they meet. Why don't you do that?

Husband—I don't know her well enough yet.

* * *

Diner—"Wouldja like to go steppin' tonite, Sister?

Waitress—Not with an old baldheaded egg like you!

Diner—Say, who's baldheaded? My hair hasn't begun to grow yet!"

* * *

Wunn—Say, isn't that fellow over there Lomtin, the 50-yard dash winner?

Tooh—Sure! And the guy with him is Bradner, the speedy relay man.

Three—They're fast friends, huh?

* * *

In the good old days the girls would all hope and pray for a husband. Now they just prey.

ANNOUNCING

A new line of DIE SETS by the
GULLBERG SALES & MANUFACTURING CO., INC.
supplementing but not replacing the Gullberg Standard line which is being maintained in its entirety.

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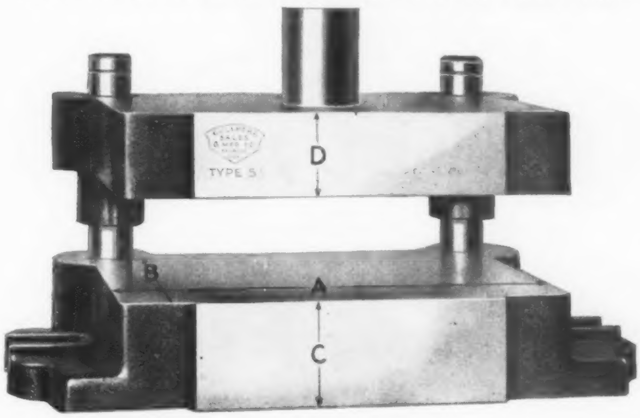
Special Die Sets of every description made to order on short notice.



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